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A

TRANSIT IMPROVEMENT PROGRAM

FOR THE

SAN FRANCISCO MUNICIPAL RAILWAY

JOHN M. WOODS

General Manager

Transit officials in San Francisco believe that this vehicle just might be the answer to the nation's urban traffic snarls and a few of its other problems.

It's name: The Streetcar.

In fact, San Francisco's Municipal Railway, the City's transit system, is getting ready to do something no American system has done for at least 18 years -- buy new streetcars...

There are, of course, reasons other than nostalgia for the development. The electrically powered transports are somewhat quieter and cause no pollution in a time when environment has become a national issue.

--- WALL STREET JOURNAL
March 30, 1970

A TRANSIT IMPROVEMENT PROGRAM

FOR THE

SAN FRANCISCO MUNICIPAL RAILWAY

by

JOHN M. WOODS
General Manager

INTRODUCTION

Recognizing the essential role of good transit in the life of a City, the people of San Francisco with great foresight established the Municipal Railway in 1912. With the purchase of the Market Street Railway in 1944 and the subsequent acquisition of the California Street Cable Railroad in 1952, all City transit services became the responsibility of the Municipal Railway.

Time has only strengthened the bond between the Muni and the City of San Francisco. Today, striving to retain what it can of its own special charm, San Francisco needs the Municipal Railway more than ever before. But the Muni needs help in its struggle to keep up with the spectacular changes the City has undergone in recent years.

Today a fine transit system is approaching the point of no return. Properties inherited from the Market Street Railway are in a seriously deteriorated condition. Reconstruction, improvement, and rehabilitation of the physical plant have been delayed during the years because of the City's apparent lack of financial resources.

Only those improvements that have been vital to safety and continued operation of the system have been accomplished.

Construction of the new Bay Area Rapid Transit District (BARTD) regional system has hastened the day of reckoning for the Muni. This program will be the key to Muni's use of the modern Market Street subway, built to accommodate our new subway-surface cars and BART. The coordination of Muni and BART systems will make San Francisco a major feature of a truly regional transit system.

This plan is the logical second step in the complete modernization of the Municipal Railway. It follows the $51,500,000 program for the renewal of rolling stock, which was approved earlier by the Public Utilities Commission and the Board of Supervisors because of the critical necessity for replacing worn out motor coaches and rail cars.

It will be nearly impossible to operate the new subway-surface cars on worn out tracks, some of which are over 50 years old. Nor can we continue to use them any longer for the gallant old PCC cars which have also given their last full measure of transit service.

Please bear in mind that for all of its physical ills, the Muni is still one of the finest transit systems in the land.

. It has given San Francisco the second highest transit riding habit (rides per capita) in the U. S. -- second only to New York City.

. The Muni is first in the nation in the category of revenue passengers per employee -- followed by New York, Alameda-Contra Costa Transit District, and the Lindenwold Line, a modern automated line carrying riders 14.5 miles from Philadelphia to New Jersey.

. Muni is first in the nation with respect to vehicle hours per inhabitant.

. Muni is first in the nation in the category of revenue passengers per mile of revenue service.

. Muni is third in the nation for revenue miles of operation per capita.

There is basis for hope and encouragement in the Municipal Railway's adversity.

It's program for modernization is advanced at a favorable point in transportation history, with transit systems in the nation in the early stages of a vast transformation. The Congress, states, and cities appear to be convinced that transit is the only sensible alternative to automotive strangulation -- that transit is a vital force in the preservation and renewal of a city.

The future is bright for significant Federal and State financial assistance to systems such as ours. And indeed this program will be eligible for up to two-thirds Federal financing from the Department of Transportation (DOT), which has already accepted a preliminary Muni application. Federal aid has accounted for over $6,000,000 -- nearly half of the cost of Muni's 400 new motor coaches.

There is reason to believe that Washington officials will be close observers of the San Francisco transit scene because here the stage was set early -- through an awareness that good mass transportation is the answer to many social and environmental problems.

An essential ingredient of the program is the retention of all five existing streetcar lines -- J (Church), K (Ingleside), L (Taraval), M (Ocean View), and N (Judah).

(It should be remembered that provisions for enhancing the Muni's electric trolley coach fleet are contained in the vehicle modernization program. With 333 of these quiet, powerful, and non-polluting vehicles, the Muni is now the biggest trolley coach operator in North America.)

When transit systems throughout the nation were phasing streetcars and trolley coaches out of service in favor of the so-called "flexibility" of diesel coaches, the Public Utilities Commission recalled that San Franciscans are a different breed. They began to look at the internal combustion engine with a jaundiced eye in the early sixties. And they have showed other definite signs of their concern for the environment.

On November 25, 1969, the Public Utilities Commission adopted a resolution instructing its staff to give particular emphasis to the use of electrically powered transit vehicles in planning future Muni improvements.

The staff of the Municipal Railway is particularly proud of the fact that this program calls for the first installation of new streetcar trackage in some 40 years. This is the recommended revenue-earning connection between the L and N Lines along the Sunset Boulevard right-of-way.

The new rail cars would bring superior transit service -- quiet and smog-free -- to this attractive boulevard, enhancing its character even more. The road bed, unlike that of the M (Ocean View) Line on Nineteenth Avenue would be landscaped, with sound muffling ground cover between the rails.

Our proposal contains several other projects that are required for continued operation of the streetcar lines -- renewal of the overhead electrical system, modernizing Forest Hill Station and Twin Peaks Tunnel, providing a modern communication control center, safety train controls, surveillance equipment, and fare collection and passenger guidance equipment.

The program will lower operating costs and promote efficiency by relocation and consolidation of motor coach shop and storage installations. This will minimize costly non-revenue mileage at the beginning and conclusion of scheduled runs; and it will facilitate assignment of equipment to particular routes.

The friends of the cable cars -- wherever they are -- should rejoice to learn that we propose to completely re-rail and rebuild tracks on all cable car lines. And as you will learn as we go into the details, we intend to extend service to Fisherman's Wharf -- a name that to visitors is synonymous with San Francisco.

It is universally recognized that re-vitalized public transit is absolutely necessary in the fight to save our cities. San Francisco is in an especially favorable position -- we have a good system on which to build for the future. We can do the job; and we will, if given the tools to work with.

Now we will present the specifics of the capital improvement program. The first major category covers what needs to be accomplished to give the City its new subway-surface rail system.

DESCRIPTION OF PROJECTS

A. Subway-Surface Rail Car Network

1. New construction, plus rebuilding and rehabilitation of existing system.

a. Rails for the new cars

New rail cars of the most sophisticated design will completely replace the present fleet of PCC streetcars. New trackage of continuous welded rail and rebuilt roadbeds are vitally necessary; otherwise, this superb equipment cannot be properly operated. Some specifics will illustrate present conditions.

The present rails in the Twin Peaks Tunnel have been in heavy use ever since 1939. Their worn condition causes side-sway and sharp vertical oscillation. In other words, the car bounces, giving the passenger a rough and uncomfortable ride.

The N (Judah) Line was built in 1928 and has never been re-railed.

Residents along the line -- the most heavily patronized in the City -- have long complained about vibration.

The L (Taraval) Line is the second most heavily patronized streetcar line, and some sections of rail on this route were constructed in 1918 and have never been replaced. New rails are an absolute necessity on both routes, both from an operating standpoint, and to provide quiet service for the benefit of residents.

The J (Church) Line was constructed in 1916; and, with the exception of two short sections, has never been re-railed.

Some sections of the K (Ingleside) Line are in good condition. For example, the stretch from the Phelan Loop west to Junipero Serra Boulevard was rebuilt in 1951 and will see more years of good service.

But much of the track east of the Loop is in bad shape, and the open track in the Junipero Serra Boulevard right-of-way dates back to 1918. These sections need to be replaced.

The rail on the M (Ocean View) Line has not been subject to such heavy use as the other lines, and has an estimated remaining life of 10 to 15 years. However, the pavement between the rails and the basalt header blocks along the rails are in poor condition. The 19th Avenue right-of-way requires better alignment and some new ties. This is essentially rehabilitation work.

1970 Estimated Cost

Re-rail of Twin Peaks Tunnel	$ 742,000
N Line	2,820,000
L Line	1,700,000
J Line	742,000
K Line	600,000
Reconstruct Pavement, M Line	127,000
	$6,731,000

b. New Overhead Wire System

Power for the streetcars is supplied through overhead wires. The present system, which dates back to 1916, was designed for trolley pole operation. The new subway-surface car will come equipped with a pantograph. This is a superior design which will eliminate losing contact with the overhead wire, speed up turnback movements in the subway, and provide a more efficient collector of current. The pantograph utilizes simpler overhead wiring, affording a safer -- faster -- operation. Also included in this item are funds for repairing and replacing worn-out poles and for traffic signal pre-emption.

Estimated Cost $1,000,000

c. Forest Hill Station

Forest Hill -- or Laguna Honda -- Station was built in 1917 and it looks it. A thorough refurbishing of the station lobby is focused on the installation of fare-collection equipment.

At present, inadequate elevator service gives patrons the choice of waiting or walking the 60-foot distance up or down between lobby and train level. New hydraulic elevators will carry passengers to both platform levels. A new crossover and stairway to grade will be added at each end of the platform for emergency exits only.

In addition, the present track platforms will be adjusted to match the floor level of the new subway cars. The new elevators and the high-level platforms will make it possible for the handicapped to travel downtown via rail.

Estimated Cost $1,200,000

d. Twin Peaks Tunnel

The Muni's two-and-a-half-mile long tunnel has been in continuous service for 54 years without any major reconstruction work, exclusive of the roadbed. The tunnel lining in certain areas has deteriorated because the reinforcing steel has been corroded by ground water. The false roof in the crown of the tunnel, which forms the ventilating duct, is supported by metal hangars.

These too are badly corroded and in dire need of replacement. The center concrete beam is cracked and has chipped off in many places, leaving the reinforcing bars exposed. This beam must be repaired.

Estimated Cost $910,000

e. Rehabilitate Communication Control Center

When the existing central control system at Geary and Presidio was installed in 1947, it was designed to handle communications with 38 supervisory and emergency cars and the headway recorder system. The Muni now has 615 radio-equipped motor and trolley coaches, in addition to 48 supervisory and emergency vehicles. Understandably, the system is overloaded and inefficient. This item will provide funds for a modern central control to be combined with the proposed new vehicle monitoring system (see New Construction, Item A-2-g).

Estimated Cost $150,000

2. New Construction

a. New Rail Car Storage and Service Facility and K Line Terminal

All streetcars are now stored and maintained at the Geneva Car House, at San Jose and Geneva Avenues. The old brick structure was built before 1906 and severely damaged during the big quake. The adjacent building which houses the offices, gilley room and locker room is in even worse condition -- structurally unsound and a safety hazard to our employees.

The Bay Area Rapid Transit District's Balboa Park Station, directly across the street, will change the character of this whole area. The Geneva Car House, offices and other buildings should be demolished, and the site then developed under a lease arrangement for commercial use with the resultant revenue paid to the Municipal Railway.

An entirely new rail car storage and maintenance facility is proposed, as the old barn could not in any case be used to store the new subway-surface cars.

It is planned to build it in the areas to be vacated by the Elkton Shop, and the Ocean Avenue Motor Coach Yard. The new facility would also contain a covered terminal for the K Line, to provide a direct transfer point to the BART Daly City line. If and when the BART line is extended to San Francisco International Airport this arrangement should prove highly successful, as residents in the southwestern part of the City could make a direct airport connection via the Muni without having to travel downtown.

The new facility would be so designed that other buildings could be erected over the rail car storage area. Leasing of these air rights over the storage area would produce additional miscellaneous revenue for the Municipal Railway.

Estimated Cost $4,100,000

b. Safety Train Control for Subway

This item includes modern electronic devices which will automatically insure safe operation of subway cars.

These devices will allow headways to be reduced to safe minimums and running speeds increased to safe maximums by giving visual commands which the vehicle operator must follow. Should safety rules be violated, sonic signals will provide velocity and distance inputs to wayside and vehicle transducers. Thus it will be possible for the system to override the operator and bring the vehicle to a stop.

This specially designed system will permit 90-second headways between cars at maximum speeds.

Estimated Cost $1,700,000

c. Fare Collection and Passenger Guidance Equipment

Although BART is building the new subway stations to be used by the Municipal Railway, the transit district will not supply fare collection or passenger guidance equipment needed by the Railway. This item will cover the cost of turnstiles to receive pre-paid fares prior to boarding subway cars in the station areas. It will also provide for exit turnstiles, area enclosures, token vendors, transfer dispensers, and all route and destination signs needed for the Muni subway operation.

Also included in this item are funds for pre-paid fares at the cable car terminals.

Estimated Cost $1,950,000

d. New Shop Equipment and Non-Revenue Rolling Stock

Modern maintenance and repair equipment is badly needed to keep rolling stock in first-class condition. This item will provide for the replacement of our present wornout machine tools and coach maintenance equipment. It will also furnish new types of maintenance equipment for the rail storage service facility, the motor coach facility, and the Central Shop.

The non-revenue rolling stock (work cars and service trucks) is old and worn out. Replacement parts are hard to get or simply non-existent. Costly repairs are not justified when compared with the cost of new vehicles. In addition, a new emergency vehicle is required for use in the subway and tunnel sections of the rail system.

Estimated Cost $520,000

e. New Rail Service Connection between the L and N Lines

This rail connection in the Sunset District is vitally important, both from the standpoint of solving a difficult operations problem and from the standpoint of providing much higher quality service for this large and vital area of western San Francisco.

First, as to operations. Without this connection, when the new subway is open, there will be no way of putting cars into service on the N and J Lines except by running them all the way from the car house at Ocean and San Jose Avenues to the track crossover just west of the Van Ness Avenue station. Such an operation would perpetuate and worsen the present situation which requires all cars to switch back at 11th and Market Streets in order to be put into revenue service on the J line and the far-reaching N line. Costly deadhead time would continue at the rate of an estimated 4,000 vehicle hours per year. But even worse, all movement in the Market Street trunk line would have to halt while cars crossed tracks and reversed direction. This would be the negation of all good Railway operating practice.

We recommend that a connecting double-track revenue service line be constructed along Sunset Boulevard. Such a route would be serviced by our new ultra-modern, extremely quiet, air-conditioned rail cars. Our recommendation of the Sunset Boulevard route comes after extensive discussion with the Planning Department. We want to emphasize the excellent cooperation the Railway has had from the staff of the Department, which is in complete agreement that this route would be superior to any other in terms of esthetics and overall impact on the environment.

Finally, in addition to providing improved service for the Sunset District and reducing operating costs, the connection will give us an emergency route for moving cars downtown in case either the Twin Peaks Tunnel or the Sunset Tunnel should be temporarily out of service.

Estimated Cost $650,000

f. Radio Antenna in Subway and Tunnels

The new subway-surface cars will be equipped with two-way radio communication. In order for cars to make contact with the Communication Control Center while running in the Market Street subway and in the Twin Peaks and Sunset Tunnels, an antenna must be provided in these underground segments. BART will have a similar installation for its system.

Estimated Cost $150,000

g. Vehicle Location Monitoring System, Communications and Surveillance Equipment

Beginning with the operation of the subway system, the new rail cars can be made up into multiple-unit trains consisting of N and J cars coupled together, and K, L, and M cars joined as trains. Inbound, the N and J cars will be coupled at Duboce Avenue and Church Street before entering the subway via the Duboce Avenue Ramp. The K, L, and M cars will be combined at the West Portal of the Twin Peaks Tunnel before proceeding downtown. This will be a precision operation, and in order to make it function properly and avoid long delays, supervisory personnel must know the exact location of each inbound car.

A vehicle location monitoring system will provide this basic operating information and will enable our inspectors to hold or dispatch subway trains as the situation dictates.

A sophisticated communications system is required between Central Control and the subway and tunnel stations, and also between station and station. In addition, public address systems will be installed both in the underground stations and in the cars, to keep passengers fully informed as to the route information and station stops.

Thirdly, an efficient surveillance system should also be provided in the subway and tunnel stations so as to detect and prevent vandalism and the commission of other crimes. This equipment will also be helpful in observing passengers who are unfamiliar with the system.

Estimated Cost $1,000,000

B. MOTOR COACH FACILITIES

1. New Combined Central Shop

The Muni now has two separate repair facilities, Elkton Shop and the Automotive Shop. Elkton Shop, at San Jose and Ocean Avenues, was thrown up in 1907 as a temporary structure to replace the Market Street Railway shops which were destroyed in the 1906 earthquake. Nothing, it seems, is so permanent as a temporary building, and the Muni is still using Elkton, even though the old woodframe building is antiquated, drafty, and inefficient.

The Automotive Shop, at 24th and Utah Streets, was formerly a streetcar barn. It is simply inadequate, in terms of both space and layout, to permit good motor coach maintenance practice.

It is recommended that the Central Shop and the Automotive Shop be combined in one structure. For best operation, the site selected should be conveniently located in relation both to Potrero Division and to the Ocean and San Jose Avenue property.

Estimated Cost $2,600,000

2. Replacement for Ocean Avenue Coach Yard

As we have previously noted, coincident with the advent of BART service and the activation of the Balboa Park Station in 1972/73, the properties adjacent to this station will be completely revitalized. The area now devoted to motor coach storage and maintenance will be used for the new rail car storage facility. Air rights over that new facility can be utilized, and the old Geneva Car House site can be disposed of profitably. Revenues from these properties can then be used to offset some of the operating deficit of the Municipal Railway.

There will remain the problem of relocating the Ocean Avenue coach division. Every effort will be made to include it as an integral part of the new combined Central Shop, or to find a site as nearly adjacent to the Shop as possible.

Estimated Cost $2,120,000

3. Replacement for Kirkland Motor Coach Yard

The Kirkland Motor Coach Yard, at North Point and Stockton Streets, was built in 1949 to store and service 175 diesel coaches. Today, it has to service 230 coaches, 44 of which must be stored overnight at Presidio Yard because we've run out of parking space at Kirkland.

Further, the surrounding property has greatly changed in character since 1949, and this block-square yard now has a much higher and better land use than for storing motor coaches. Therefore it is recommended that this property be offered for sale or lease and that a new site be found for a large coach facility to replace Kirkland Yard.

Estimated Cost $2,120,000

4. Addition of Motor Coach Space to Potrero Yard

The Potrero Trolley Coach Yard (17th Street near Potrero Avenue) is built on two levels and has an adjacent storage yard. All trolley coaches at this division are stored on the lower level, and the upper level is used for body repairs and painting, with additional space utilized to store old motor coaches. The upper level could accommodate additional motor coach storage, with a saving in operating cost.

This item also provides funds for fuel and lubricating facilities, for lifts, and for other maintenance equipment.

Estimated Cost $160,000

5. New Passenger Shelters

It is proposed to erect 50 open-front waiting shelters throughout the City at major transfer points. These shelters, simple, functional, and attractively designed, would provide a built-in bench and covered standing space. In some instances they would replace obsolete existing shelters.

Estimated Cost $165,000

C. CABLE CAR SYSTEM

1. Construct New Cable Cars and Rebuild Existing Cars

The overloaded cars of San Francisco's cherished Powell cable car lines cannot handle the heavy volume of passenger traffic. In order to provide improved service for San Francisco residents -- and better serve the thousands of tourists who visit the City each year -- we propose to build three new cable cars and add them to the fleet. In addition, seven of the existing cars which badly need repair would be completely reconstructed.

Estimated Cost $370,000

2. Cable Car Extension to Fisherman's Wharf

The present terminus of the No. 59 (Powell-Mason) Line at Bay and Taylor Streets is awkward and constitutes an increasingly severe traffic hazard. For many years it has been proposed to extend the line to the Fisherman's Wharf area. The extension would provide direct service to the Wharf and eliminate the traffic bottleneck at Bay Street.

Estimated Cost $590,000

3. Reconstruct and Re-rail Existing Lines

The Cable Car System is essentially the same today as it was in the 1890's, with the exception of some minor improvements. We propose this and the following two steps for better operation and increased safety.

The track will be re-railed, switches will be renewed, and mechanisms below street level will be reconstructed. Most of the work will be done at night to minimize service shutdowns.

Estimated Cost $1,360,000

4. Electronic Alarm System

Cable strands on occasion become entwined in the grip of the car. The gripman cannot always drop the cable and, as a result, loses control. An electronic alarm system on each cable car would enable the gripman to signal the Cable Car Barn, where the operating engineer could immediately shut down the cable-winding machinery. Central Control, informed of the nature and location of the problem, would immediately dispatch emergency equipment. Instant communication afforded by this equipment would significantly reduce accidents.

Estimated Cost $62,000

5. Improvements to Cable Car Lights and Braking Systems

Electricity for the cable car lights is furnished by a six-volt battery installed in the car, and the system is totally inadequate. The battery cannot be recharged while the car is in service, and the lights grow dimmer as the night progresses. This item would provide for a 12- or 24-volt system which would appreciably increase the illumination from the headlights and would not lose strength during the course of a night's run.

The braking system on the cable car consists of four separate elements: (1) wheel brake; (2) track brake; (3) slot brake; and (4) cable grip, which acts as a brake in the sense that when it is securely engaged with the rope the speed of the car cannot exceed 9-1/2 miles an hour. Despite the use of these four separate types of brake, cable car accidents continue to be a cause of concern. Funds provided by this item would finance a study of improvements which could be incorporated into the car's braking system.

Estimated Cost $78,000

SUMMATION

We have endeavored to demonstrate the urgent need for upgrading and modernizing the ways and structures of the Municipal Railway.

Benefits will be realized in direct proportion to accomplishments. Consolidation and modernization will yield greater efficiencies and economies in operation. Improving and extending the track system will result in greater flexibility and ability to meet the expected increase in passenger volume.

Schedule reliability and increased capacity of transit vehicles will discourage automobile traffic, and increased patronage will redound to the benefit of the Muni.

In a closely related area, the Public Utilities Commission is developing a community relations-promotion undertaking aimed at establishing a healthy rapport between the Muni and the public it serves. This program will also sharpen this City's advocacy of public transit -- giving the Municipal Railway the attention it deserves and is so long overdue.

As essential as this community relations project is, its effectiveness will be limited until the main issue of improving and modernizing the basic system is accomplished.

TABLE I

SAN FRANCISCO MUNICIPAL RAILWAY

197_ TRANSIT IMPROVEMENT PROGRAM

A.	SUBWAY-SURFACE RAIL CAR SYSTEM	
1.	Reconstruction and Rehabilitation of Present Facilities	
a.	Re-rail Twin Peaks Tunnel	$ 742,000
	" N Line	2,820,000
	" L "	1,700,000
	" J "	742,000
	" K "	600,000
	Reconstruct Pavement, M Line	127,000
b.	New Overhead Wire System	1,000,000
c.	Forest Hill Station	1,200,000
d.	Twin Peaks Tunnel	910,000
e.	Rehabilitate Communication Control Center	150,000
	Subtotal	$9,991,000
2.	New Construction	
a.	New rail car storage and service facility and K line terminal (retention of all 5 streetcar lines)	4,100,000
b.	Safety train control for subway	1,700,000
c.	Fare Collection & Passenger Guidance Equipment	1,950,000
d.	New Shop Equipment - Rail & Coach and non-revenue rolling stock	520,000
e.	New rail service connection between L and N Line	650,000
f.	Radio Antenna in Subway & Tunnels	150,000
g.	Vehicle Location Monitoring System, Communications & Surveillance Equipment	1,000,000
	Subtotal	$10,070,000

(Table I continued)

B.	MOTOR COACH FACILITIES	
1.	New Combined Central Shop	$ 2,600,000
2.	Replacement for Ocean Avenue Coach Yard	2,120,000
3.	Replacement for Kirkland Motor Coach Yard	2,120,000
4.	Addition of Motor Coach Space to Potrero Yard	160,000
5.	New Passenger Shelters	165,000
	Subtotal	$7,165,000
C.	CABLE CAR SYSTEM	
1.	Build Three New Cable Cars and Rebuild Seven	$ 370,000
2.	Extension to Fisherman's Wharf	590,000
3.	Reconstruct and Re-rail Existing Lines	1,360,000
4.	Electronic Alarm System	62,000
5.	Improvements to Cable Car Lights & Braking System	78,000
	Subtotal	$2,460,000
	Total	$29,686,000
	Engineering & Administration	2,970,000
	Inspection	594,000
	Escalation	6,750,000
	Contingencies	4,000,000
	TOTAL PROGRAM COST	$44,000,000

TABLE II

SAN FRANCISCO MUNICIPAL RAILWAY

CAPITAL IMPROVEMENT PROGRAM 1971-1975

SCHEDULE OF COSTS PER FISCAL YEAR

	1971-72	1972-73	1973-74	1974-75	Total
A. Subway-Surface Rail Car System	14,976,000	12,815,000	1,964,000		29,755,000
B. Motor Coach Facilities	6,864,000	530,000	2,971,000		10,365,000
C. Cable Car System	182,000	1,410,000	72,000	2,216,000	3,880,000
TOTAL	22,022,000	14,755,000	5,007,000	2,216,000	44,000,000

TABLE III

COMPARISON OF RUNNING TIMES

MONTGOMERY & MARKET STREETS TO OUTER TERMINALS

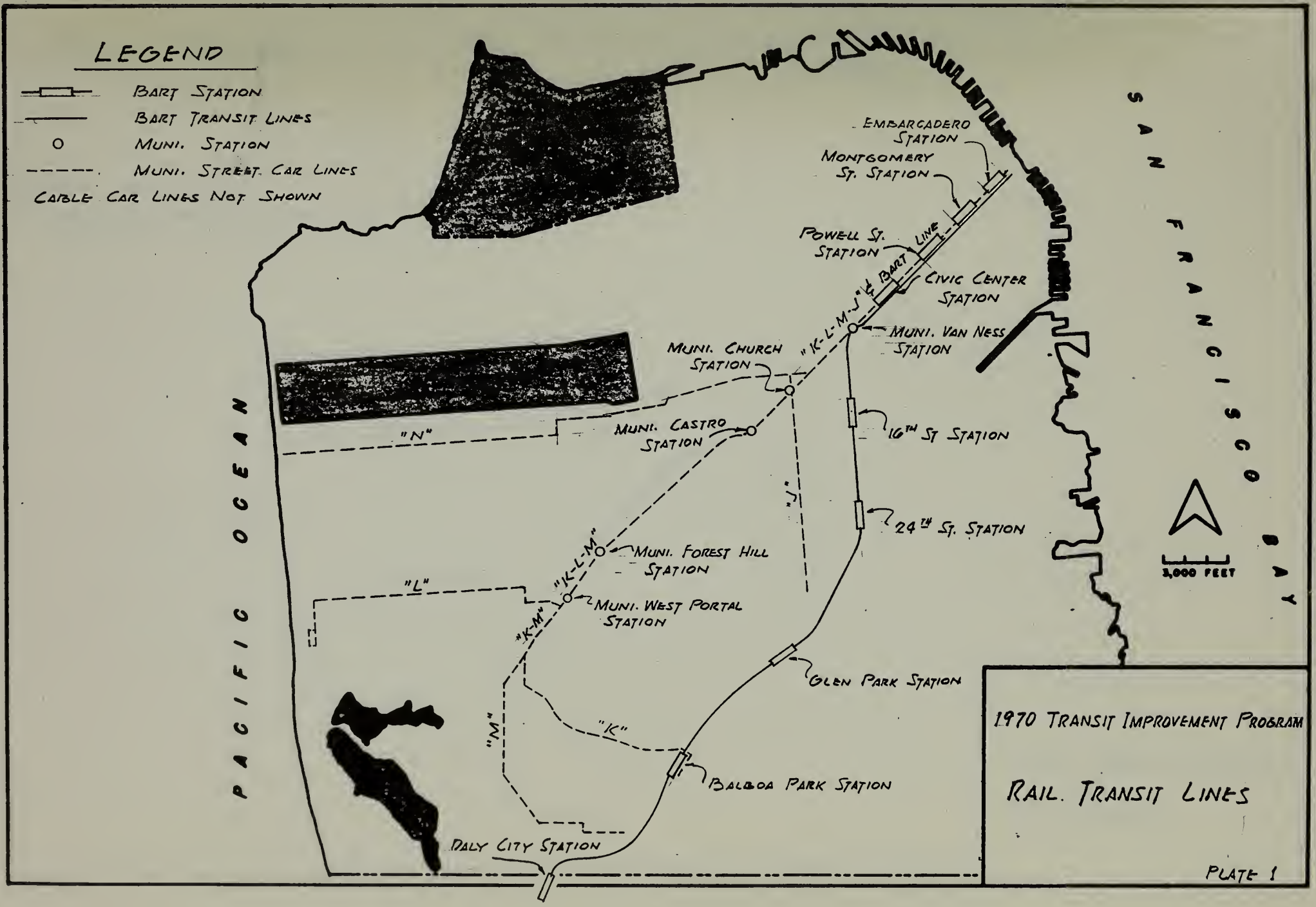
EVENING RUSH HOUR

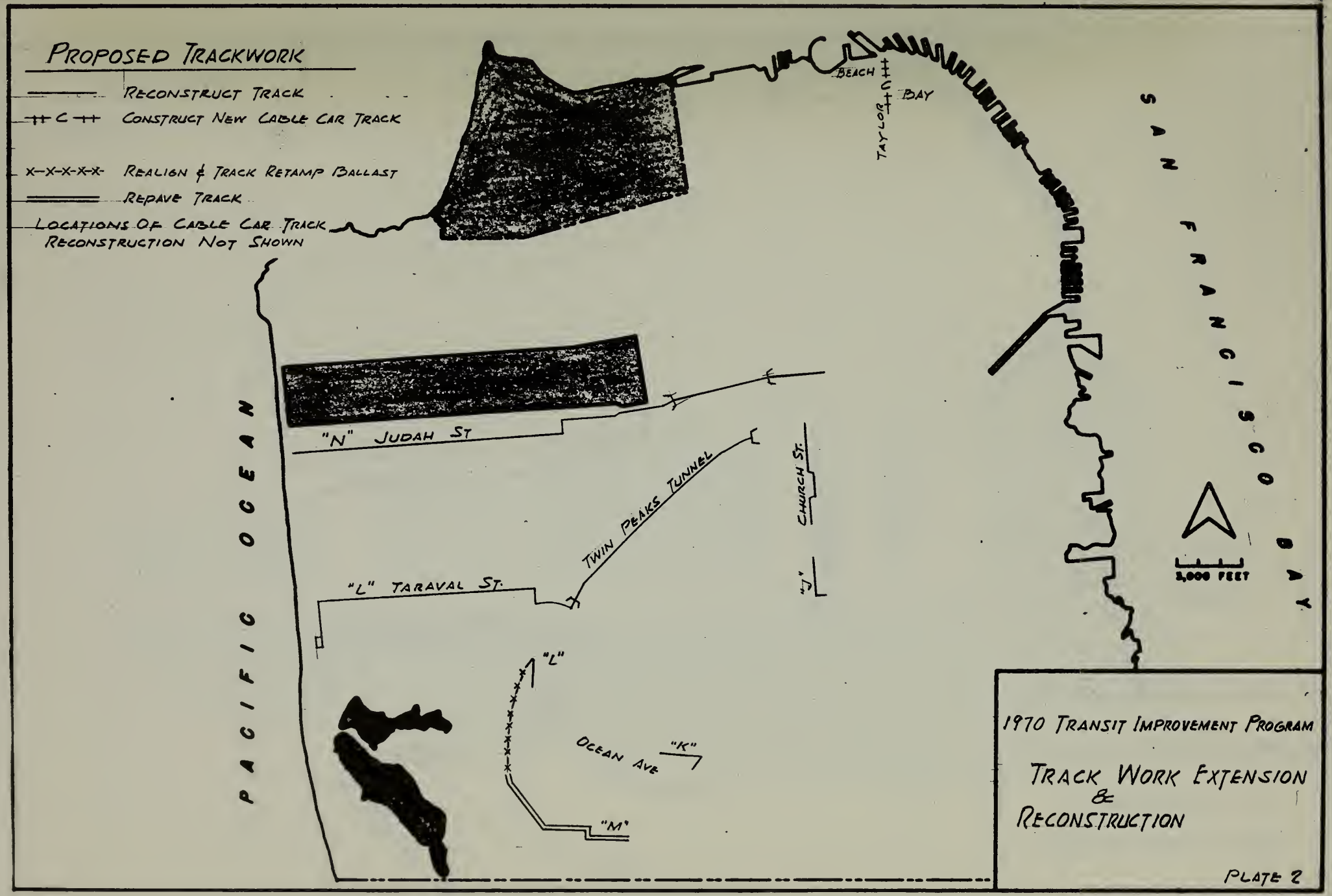
Line No.	PRESENT P.C.C. STREET CAR Running Time	PROPOSED SUBWAY SURFACE CAR Running Time	SAVINGS IN RUNNING TIME
J	29-1/2 Min.	19 Min.	10-1/2 Min.
K	41 Min.	26 Min.	15 Min.
L	44-1/2 Min.	29-1/2 Min.	15 Min.
M	46 Min.	31 Min.	15 Min.
N	42-1/2 Min.	32-1/2 Min.	10 Min.

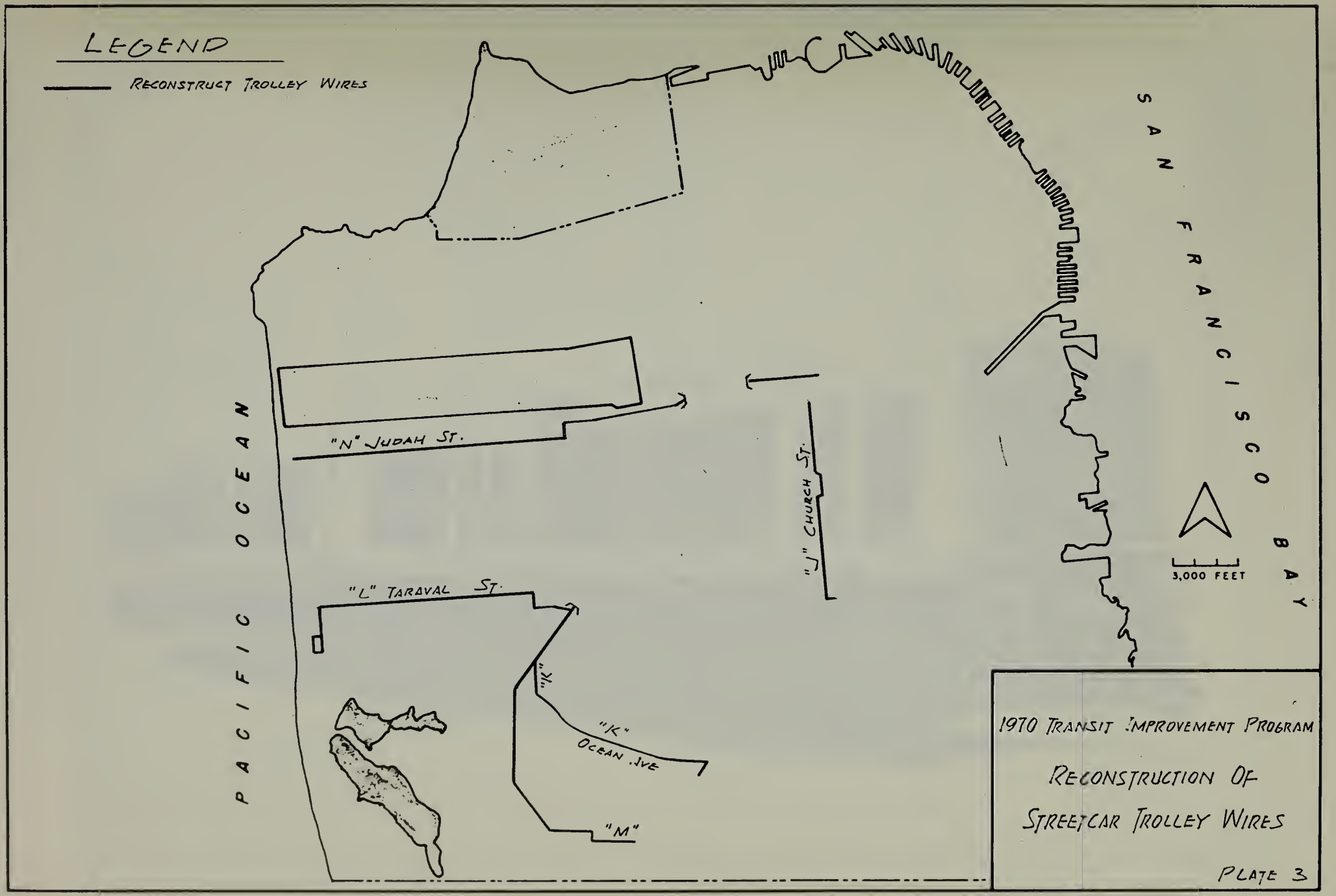
TABLE IV

SAN FRANCISCO MUNICIPAL RAILWAY
1970 TRANSIT IMPROVEMENT PROGRAM
DEBT SERVICE REQUIREMENTS
(IN THOUSANDS OF DOLLARS)
Estimated 7% Interest Cost

Fiscal Year	Debt Service "A"	"B"	"C"	"D"	Total Debt Service	Fiscal Year	Bond Sales	
1972-73	$ 1,584	$	$	$	$ 1,584	1972-73		
73-74	1,584	1,706			3,290	73-74		
74-75	1,584	1,706	632		3,922	74-75		
75-76	1,584	1,706	632	198	4,120	75-76		
76-77	1,584	1,706	632	198	4,120	76-77		
77-78	1,584	1,706	632	198	4,120	77-78	1971-72	$22,022
78-79	1,584	1,706	632	198	4,120	78-79	1972-73	14,755
79-80	1,584	1,706	632	198	4,120	79-80	1973-74	5,007
80-81	1,584	1,706	632	198	4,120	80-81	1974-75	2,216
81-82	1,584	1,706	632	198	4,120	81-82		
82-83	1,584	1,706	632	198	4,120	82-83		
83-84	1,584	1,706	632	198	4,120	83-84		
84-85	1,584	1,706	632	198	4,120	84-85		
85-86	1,584	1,706	632	198	4,120	85-86		
86-87	1,584	1,706	632	198	4,120	86-87		
87-88	1,584	1,706	632	198	4,120	87-88		
88-89	1,584	1,706	632	198	4,120	88-89		
89-90	1,584	1,706	632	198	4,120	89-90		
90-91	1,584	1,706	632	198	4,120	90-91		
91-92	1,584	1,706	632	198	4,120	91-92		
92-93		1,706	632	198	2,536	92-93		
93-94			632	198	830	93-94		
94-95				198	198	94-95		
	$31,680	$34,120	$12,640	$3,960	$82,400		Total	$44,000


LEGEND
BART STATION
BART TRANSIT LINES
MUNI. STATION
MUNI. STREET CAR LINES
CABLE CAR LINES NOT SHOWN
EMBARCADERO STATION
MONTGOMERY ST. STATION
POWELL ST. STATION
BART LINE
CIVIC CENTER STATION
"K-L-M-J"
MUNI. VAN NESS STATION
MUNI. CHURCH STATION
MUNI. CASTRO STATION
"N"
16TH ST STATION
"J"
24TH ST. STATION
"K-L-M"
MUNI. FOREST HILL STATION
"L"
"K-M"
MUNI. WEST PORTAL STATION
GLEN PARK STATION
"M"
"K"
BALBOA PARK STATION
DALY CITY STATION
PACIFIC OCEAN
SAN FRANCISCO BAY
2,000 FEET
1970 TRANSIT IMPROVEMENT PROGRAM
RAIL TRANSIT LINES
PLATE 1


PROPOSED TRACKWORK
RECONSTRUCT TRACK
C CONSTRUCT NEW CABLE CAR TRACK
X-X-X-X-X- REALIGN & TRACK RETAMP BALLAST
REPAVE TRACK
LOCATIONS OF CABLE CAR TRACK RECONSTRUCTION NOT SHOWN
BEACH
TAYLOR
BAY
SAN FRANCISCO BAY
PACIFIC OCEAN
"N" JUDAH ST
TWIN PEAKS TUNNEL
CHURCH ST.
"J"
"L" TARAVAL ST.
"L"
OCEAN AVE
"K"
"M"
2,000 FEET
1970 TRANSIT IMPROVEMENT PROGRAM
TRACK WORK EXTENSION & RECONSTRUCTION
PLATE 2


LEGEND
RECONSTRUCT TROLLEY WIRES
PACIFIC OCEAN
SAN FRANCISCO BAY
"N" JUDAH ST.
"J" CHURCH ST.
"L" TARAVAL ST.
"K"
"K" OCEAN AVE
"M"
3,000 FEET
1970 TRANSIT IMPROVEMENT PROGRAM
RECONSTRUCTION OF
STREETCAR TROLLEY WIRES
PLATE 3

MM 1

Louis T. Klauder and Associates / Peter Muller-Munk Associates Inc.

MM 2

Louis T. Klauder and Associates / Peter Muller-Munk Associates Inc.